

SHOP
OPERATIONS

SHOP OPERATIONS



SHOP OPERATIONS

TERMINAL LEARNING OBJECTIVES

- Provided references, maintenance facility, maintenance forms, personnel, tools, and engineer equipment, conduct shop operations, to maintain unit readiness without injury to personnel or damage to equipment. (1341-ADMN-1001).
- Provided tool sets, chests, kits, and references, conduct inventory of tool sets, chests, kits, to reconcile inventory records for accountability and serviceability per the references. (1341-ADMN-1002)
- Given an assigned maintenance role, computer and required equipment forms/records, use the Maintenance Automated Information System (MAIS) to

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ENABLING LEARNING OBJECTIVES

- Provided references, identify the operational risk management process, per the MCO 3500.27, OPNAVINST 3500.39, and MCDP 1. (1341-ADMN-1001a)
- Provided reference, identify maintenance levels, per the MARADMIN 581/03. (1341-ADMN-1001b)
- Provided reference, identify maintenance phases to conduct engineer equipment maintenance per the MCO 4790.2_. (1341-ADMN-1001c)
- Provided the reference, identify the characteristics of engineer equipment, per the TM 11275-15/3D. (1341-ADMN-1001d)
- Provided references, and student handout, perform technical manual research per the 11503A-OI/3, TM 10794A-24/2, TM 10794A/B-24P/3 and TM 11503A-OI/4. (1341-ADMN-1001e)
- Provided reference, identify the technical manual that provides instructions for preparation, use, and disposition of engineer equipment records and forms per the student handout. (1341-ADMN-1001g)
- Provided reference, identify engineer equipment records and forms per the TM 4700-15/1_. (1341-ADMN-1001h)
- Provided reference, engineer equipment records and forms, identify the mechanics required entries per the TM 4700-15/1_. (1341-ADMN-1001i)
- Provided references, and student handout, perform parts research per the TM 10794A/B-24P/3 and TM 11503A-OI/3. (1341-ADMN-1001f)

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ENABLING LEARNING OBJECTIVES

- Provided reference, identify tools kits, per the TM 10510-OD/1K. (1341-ADMN-1001j)
- Provided reference, demonstrate correct use of tools, per the TM 10209-10/1. (1341-ADMN-1001k)
- Provided a general mechanics tool kit (GMTK), an inventory sheet, and references, inventory the GMTK for accountability per the TM 4700-15/1_, and SL-3-11668A. (1341-ADMN-1002a)
- Provided a GMTK, an inventory sheet, and references, inventory the GMTK for serviceability of tools per the TM 4700-15/1_, and SL-3-11668A. (1341-ADMN-1002b)
- Given an assigned maintenance role, computer and required equipment forms/records, create a service request for approval, per the established maintenance policy. (1341-ADMN-10XXa)
- Given an assigned maintenance role, computer and required equipment forms/records, create a parts request for approval, per the established maintenance policy. (1341-ADMN-10XXb)
- Given an assigned maintenance role, computer and required equipment forms/records, update the service request to record maintenance status, per the established maintenance policy. (1341-ADMN-10XXc)



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METHOD/MEDIA.



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Instructional Rating Forms



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EVALUATION



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SAFETY/CEASE TRAINING (CT) BRIEF

Operational Risk Management

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ORM CONCEPT

- Decision making tool
 - Used by all people at all levels
 - Increase operational effectiveness
 - Anticipating hazards
 - Reducing the potential for loss
 - Increasing probability of a successful mission

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ORM CONCEPT

- Increases our ability to make informed decisions by providing the best baseline of knowledge and experience.
- Minimizing risks to acceptable levels based on mission accomplishment
 - Risk in war > than in peacetime
 - Process is still the same

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ORM CONCEPT

- Applying the ORM Concept will:
 - Reduce mishaps
 - Lower costs
 - Provide for more efficient use of resources

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ORM TERMS

- Hazard - A condition with the potential to cause:
 - Personal injury
 - Death
 - Property damage
 - Mission degradation
- Risk - Expression of possible loss in terms of:
 - Severity
 - Probability
- Risk Assessment
 - A process of detecting hazards & Assessing associated risks

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ORM TERMS

- Operational Risk Management
 - A process of dealing with risks associated with Military operations, which include:
 - Risk assessment
 - Risk decision making
 - Implementation of effective risk controls

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ORM PROCESS

- Five steps:
 - Identify hazards
 - Assess hazards
 - Make risk decisions
 - Implement controls
 - Supervise

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ORM PROCESS

1) Identify Hazards:

- Outline/chart major steps in the operation
- (Operational analysis)
- Conduct preliminary hazard analysis
- List all hazards associated with each step
- List all causes of those hazards

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ORM PROCESS

2) Assess Hazards:

- Each hazard identified
- Determine associated risk
 - Probability
 - Severity

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ORM PROCESS

3) Make Risk Decisions:

- Develop risk control options
 - Serious risk first
 - Select controls to reduce risk
 - (Mission accomplishment)
- Controls in place - decide
 - Benefit of operation outweigh risk?
 - Communicate with higher authority
 - Chain of Command

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ORM PROCESS

4) Implement Controls

- These are measures that can be implemented to eliminate hazards or reduce the degree of risk.
 - Engineering controls
 - Administrative controls
 - Personal protective equip

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ORM PROCESS

- Engineering Controls
 - Engineering methods to reduce risks.
 - Design
 - Material selection
 - Material substitution
 - Technically - feasible
 - Economically

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ORM PROCESS

- Administrative Controls
 - Reduce risk through specific admin actions.
 - Provide suitable:
 - Warnings
 - Markings
 - Signs
 - Notices
 - Establish written:
 - Policies
 - Programs
 - Instructions
 - SOPs

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ORM PROCESS

- Administrative Controls (Cont.)
 - Train Personnel to:
 - Recognize hazards
 - Take appropriate actions
 - Limit the exposure to a hazard
 - Reduce number of personnel/assets
 - Length they are exposed

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ORM PROCESS

5) Supervise

- Conduct-follow up evaluations of controls to ensure they:
 - Remain in place
 - Have the desired effect
- Continuously monitor for changes and take corrective action when needed

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LEVELS OF ORM

- ORM exists on three levels:
 - Time-critical
 - Deliberate
 - In-depth
- Commander selects which level of ORM depending on:
 - Mission
 - Situation
 - Time available
 - Proficiency level
 - Assets available

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LEVELS OF ORM

- Objective of ORM:
 - Develop sufficient proficiency in applying the process so that ORM becomes an automatic or intuitive part of our decision making methodology.

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LEVELS OF ORM

- Time Critical
 - “On the run” mental or oral review of the situation
 - Uses the five-step process without recording the information on paper
 - Employed by experienced personnel
 - Used to consider risks in a time-compressed situation
 - Normally used:
 - During the execution phase of training or operations
 - In planning during crisis response scenarios
 - Helpful in choosing course of action when an unplanned event occurs

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LEVELS OF ORM

- Deliberate
 - This is the complete application of the five-step process:
 - Used for planning an operation or evaluating procedures
 - Most effective when conducted in a group

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LEVELS OF ORM

- In-Depth
 - Deliberate process with a more thorough assessment
 - Research of available data
 - Use of diagram and analysis tools
 - formal testing
 - Long term tracking of the hazards

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FOUR PRINCIPALS OF ORM

1) Accept risk when the benefits outweigh the cost

- MCDP, War fighting, states

“Risk is inherent in war and is involved in every mission. Risk is also related to gain; normally greater potential gain requires greater risk.”

- The goal of ORM is not to eliminate risk, but to manage the risk so that the mission can be accomplished with a minimum amount of loss.

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FOUR PRINCIPALS OF ORM

2) Accept no unnecessary risk

MCDP also states,

“We should clearly understand that the acceptance of risk does not equate to the imprudent willingness to gamble...”

- Take only risks necessary to accomplish the mission

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FOUR PRINCIPALS OF ORM

3) Anticipate and manage risk by planning

- Controlled easier when identified early

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FOUR PRINCIPALS OF ORM

4) Make risk decisions at the right level

- Leader directly responsible for the operation makes risk management decisions
- Critical Elements:
 - Prudence
 - Experience
 - Intuition
 - Situational awareness of leaders

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RISK ASSESSMENT MATRIX

- Used during the second step of ORM
- Can provide a consistent framework for evaluating work
- Based on:
 - Elements of hazard severity
 - Mishap probability

Risk Management Matrix OPNAVINST 3500.39B		P R O B A B I L I T Y				
		A	B	C	D	
		Likely	Probable	May	Unlikely	
S E V E R I T Y	I Death, Loss of Asset	1	1	2	3	
	II Severe Injury, Damage	1	2	3	4	
	III Minor Injury, Damage	2	3	4	5	
	IV Minimal Threat	3	4	5	5	
		1-Critical	2-Serious	3-Moderate	4-Minor	5-Negligible

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RISK ASSESSMENT MATRIX

- Hazard severity:
 - Assessment of the worst consequence or result of a hazard.
 - Severity - potential degree of:
 - Injury
 - Illness
 - Property damage
 - Loss of assets (time - \$ - personnel)
 - Effect on mission

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RISK ASSESSMENT MATRIX

- Hazard severity: Four categories
 - Category I
 - Death
 - Loss of facility
 - Grave damage to national interests
 - Category II:
 - Severe injury
 - Property damage
 - Damage to national interests

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RISK ASSESSMENT MATRIX

- Hazard severity: Four categories (Cont.)
 - Category III:
 - Minor injury
 - Minor property damage
 - Minor damage to national interests
 - Category IV: Minimal Threat

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RISK ASSESSMENT MATRIX

- Mishap Probability:
 - Hazard will result in a mishap/loss based on:
 - Location
 - Exposure
 - Affected populations
 - Experience
 - Previous information

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RISK ASSESSMENT MATRIX

- Mishap Probability: 4 sub-categories
 - Sub-category **A**:
 - Likely to occur immediately or within a short period of time
 - Sub-category **B**:
 - Probably will occur in time
 - Sub-category **C**:
 - May occur in time
 - Sub-category **D**:
 - Unlikely to occur

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RISK ASSESSMENT MATRIX

Risk Management Matrix		Probability			
		A Likely	B Probabl	C May	D Unlikel
Severity	I Death, Loss of Asset	1	1 ^e	2	3 ^y
	II Severe Injury,	1	2	3	4
	III Damage Minor Injury,	2	3	4	5
	IV Damage Minimal Damage	3	4	5	5

RAC 1 - Critical

RAC 2 - Serious

RAC 3 - Moderate

RAC 4 - Minor

RAC 5 - Negligible

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ORM REVIEW

- ORM concept
- ORM terms
- ORM process
- Levels of ORM
- Principles of ORM
- Develop a risk assessment matrix

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QUESTIONS

- Q. What are the five steps of the Operational Risk Management Process?
- A. Identify the hazards, Assess the Hazards, Make risk decisions, Implement controls, and Supervise.
- Q. What are the three levels of Operational Risk Management?
- A. Time-critical, deliberate and in-depth.

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MAINTENANCE STRUCTURE



SHOP OPERATIONS

Terms and Acronyms

- DL: Deadline
 - To completely remove a piece of gear from service due to necessary repairs, damage, and/or malfunctions that has already or could eventually render it unsafe or impossible to operate

SHOP OPERATIONS

Terms and Acronyms (cont.)

- PMCS: Preventive Maintenance Checks and Services
 - Maintenance performed by mechanics and operators at intervals to preserve the life of components and assemblies.
 - Involves inspecting, cleaning, servicing, lubricating, adjusting, and minor repair.
- CM: Corrective Maintenance
 - Action taken to repair an item of equipment after failure which degrades its operational capabilities
- PEB: Pre Expended Bin
 - Location where high use, low cost items and broken units of issue are kept

MAINTENANCE STRUCTURE

MAINTENANCE OVERVIEW

- The Marine Corps utilizes different stages or levels of maintenance.
 - These levels are identified by categories and further broken down into echelons.
 - Specific responsibilities are assigned to each category of maintenance
 - Categories are further subdivided into echelons to more accurately define capabilities and responsibilities
 - Maintenance is allocated according to personnel, tools, equipment, and parts availability

MAINTENANCE STRUCTURE

CATEGORIES AND ECHELONS OF MAINTENANCE

- Three categories and five echelons of maintenance
 - Organizational Maintenance
 - 1st and 2nd echelons of maintenance (EOM)
 - Intermediate Maintenance
 - 3rd and 4th echelons of maintenance (EOM)
 - Depot Maintenance
 - 5th echelon of maintenance (EOM)

MAINTENANCE STRUCTURE

ORGANIZATIONAL MAINTENANCE

- Maintenance performed by, and is the responsibility of, the using unit on its assigned equipment
- Operators (1st EOM) and mechanics (2nd EOM) share responsibilities for ensuring maintenance is performed
- Maintenance performed ensures equipment readiness through PMCS and CM

MAINTENANCE STRUCTURE

1ST EOM

- Performed by the user, wearer, or operator
- It includes the proper care, use, operation, cleaning, preservation, lubrication, and adjustment
- They are authorized to perform minor repairs, testing, and parts replacement according to applicable TMs (TM-10 series) and authorized repair parts and tools

MAINTENANCE STRUCTURE

2ND EOM

- Performed by specially trained personnel (mechanics).
- Authorized additional tools and parts, supplies, test equipment, and skilled personnel to perform maintenance beyond the capabilities and facilities of first echelon.
- Responsibilities include performance of scheduled maintenance, diagnosis and isolation of readily traced equipment malfunctions; replacement of major assemblies/components which can be readily removed/installed and do not require

MAINTENANCE STRUCTURE

INTERMEDIATE MAINTENANCE

- Maintenance performed by designated activities in support of using units
- Maintenance includes the calibration and repair or replacement of damaged or unserviceable parts and provides contact team support to using organizations
- Made up of 3rd and 4th echelons but may include some 2nd echelon to fulfill organizational overflow requirements

MAINTENANCE STRUCTURE

3rd EOM

- Diagnosis and isolation of equipment/modular malfunctions
- Adjustment and alignment of modules using test, measurement, and diagnostic equipment (TMDE)
- Repair by replacement of modular components and parts which do not require extensive post-maintenance testing or adjustment
- Limited repair of modular components requiring cleaning, seal Replacement, application of external parts, and repair kits
- Accomplishment of minor body work and

MAINTENANCE STRUCTURE

4TH EOM

- Associated with semi fixed or permanent shops of intermediate maintenance activities.
- Maintenance includes diagnosis, isolation, adjustment, calibration, alignment, and repair of malfunctions to internal parts
- Replacement of defective modular components not authorized at lower echelons
- Repair of major modular components by grinding or adjusting items such as valves, tappets, and seats
- Replace internal and external parts such as integrated and printed circuits
- Performance of heavy body, hull turret, and frame repair.

MAINTENANCE STRUCTURE

DEPOT MAINTENANCE

- Maintenance requiring major overhaul or the complete rebuilding of parts, subassemblies, assemblies, and end items
 - Commonly referred to as rebuild centers
- Manufactures parts
- Performs required modifications and testing
- Performs maintenance beyond the responsibilities of lower echelons and provides them with technical assistance
- Provides stocks of serviceable equipment
- 5th echelon of maintenance

MAINTENANCE STRUCTURE

5TH EOM

- Maintenance normally performed by depot maintenance activities and at intermediate maintenance activities when authorized
- It includes overhaul or rebuild of end items and modular components
- Repairs which exceed the capability of lower echelon units where special environmental facilities or specific tolerances are required
- Special inspection and modification requiring extensive disassembly or elaborate test equipment

MAINTENANCE STRUCTURE

LEVELS OF MAINTENANCE

- The Marine Corps will soon structure its maintenance priority into what will be considered Levels of Maintenance (LOM, formerly categories and echelons)
 - These levels have been identified by name to clarify responsibilities according to the type and depth of maintenance being performed
 - Specific responsibilities are assigned to each level of maintenance
 - Maintenance is allocated according to personnel, tools, equipment, and parts availability

MAINTENANCE STRUCTURE

LEVELS OF MAINTENANCE

Operator/Crew(formerly Organizational consisting of 1st and 2nd echelons of maintenance)

- Maintenance performed by, and is the responsibility of, the using unit on its assigned equipment
 - Includes the proper care, use, operation, cleaning, preservation, lubrication, and adjustment according to their maintenance allocation
 - They have been given a more mechanical responsibility (from 2nd EOM) than in the past and are now authorized to perform minor corrective maintenance
 - Replacement of some easily accessible parts and components
- Their objective is to sustain their equipment in a mission capable status

MAINTENANCE STRUCTURE

LEVELS OF MAINTENANCE

Field (Formerly Intermediate consisting of 3rd and 4th EOM)

- 2nd EOM is now part of Field LOM and 4th EOM has left some of their responsibilities but moved to “Sustainment LOM”
- Maintenance performed by designated activities (trained technicians/mechanics) in support of using units
- Includes the calibration and repair or replacement of damaged or unserviceable parts/components and provides contact team support to using organizations
- Authorized an extended inventory of tools (above the Operator/Crew level) to fulfill maintenance requirements
- Their objective is to return equipment to a mission capable status

MAINTENANCE STRUCTURE

LEVELS OF MAINTENANCE

Sustainment (formerly Depot consisting of 5th EOM)

- Now utilizes the flexibility and mobility of 4th EOM as well
- Maintenance requiring major overhaul or the complete rebuilding of components, subassemblies, assemblies, and end items
- Manufactures parts
- Performs in depth modifications and testing
- Performs maintenance beyond the responsibilities of lower levels and provides them with technical assistance
- Provides stocks of serviceable equipment
- Their objective is to sustain equipment throughout its lifecycle

MAINTENANCE STRUCTURE

MAINTENANCE STRUCTURE REVIEW

- The three Categories of Maintenance
- The five Echelons of Maintenance
- The three Levels of Maintenance

MAINTENANCE STRUCTURE

QUESTIONS

- Q. Which echelon of Maintenance is the most important?
- A. 1st echelon.
- Q. What level of Maintenance sustains stocks of serviceable equipment?
- A. Sustainment level of Maintenance.

MAINTENANCE STRUCTURE



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ENGINEER EQUIPMENT



TEREX



JOHN DEERE



SHOP
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ENGINEER EQUIPMENT

**JOHN DEERE
TRAM**



5/25/17

ENGINEER EQUIPMENT

TRAM

DESCRIPTION AND FUNCTION

- Tractor, Rubber-Tired, Articulated Steering, Multipurpose
- Diesel-powered, four-wheel drive.
- Capable of operating in rough terrain and in up to 60 inches of water.
- Outfitted with a 2-1/2 Yard 4-In-1 Multi-Purpose Bucket, a 10,000 pounds Forklift Attachment
- Maximum speed 24 mph (39 km/h)
- Manufactured by John Deere Co.

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ENGINEER EQUIPMENT

**JOHN DEERE
850JR MCT**



5/25/17

ENGINEER EQUIPMENT

MEDIUM CRAWLER TRACTOR (MCT) 850JR

DESCRIPTION AND FUNCTION

- Diesel-engine driven, militarized crawler type, medium-drawbar pull tractor.
- Equipped with Roll Over Protection Structure (ROPS) and Falling Objects Protective Structure (FOPS)
- Hydraulically powered semi-U (straight) type blade with a maximum drawbar pull of 35,000 pounds.
- Equipped with all components necessary to enable the tractor to function the following attachments: a 3-shank ripper or a rear-mounted winch and drawbar/towing coupler.
- Manufactured by John Deere Co.

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ENGINEER EQUIPMENT



**CATERPILLAR
420 BACKHOE**



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ENGINEER EQUIPMENT

420EIT BACKHOE LOADER

DESCRIPTION AND FUNCTION

- Highly mobile, light weight, rubber tired
- Equipped with a front-end loader and backhoe excavator
- Capable of operating hydraulic power tools
- Reaches road speeds in excess of 20 mph

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ENGINEER EQUIPMENT



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ENGINEER EQUIPMENT

120M GRADER

DESCRIPTION AND FUNCTION

- Self-propelled grading machine powered by a diesel engine.
- Rubber tires, six-wheel drive, and an articulated frame with front-wheel steer design
- Equipped with a 12' blade with a maximum shoulder reach of 6' outside the wheels and has a maximum lift above ground of 16".
- Reconfigurable to accept an armored cab kit. The advanced joy stick control system replaces the traditional array of levers and steering wheel, which greatly simplifies motor grader operation by placing total machine, drawbar, and moldboard control into both of the operator's hands.
- Applications of the 120M include grading coarse and fine soil, creating low and high bank slopes, flat and V-ditches, scarifying, removing snow, and building and maintaining roads and airfields.

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ENGINEER EQUIPMENT

**TEREX
5K LCRTF**



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ENGINEER EQUIPMENT

TEREX 5K LCRTF

DESCRIPTION AND FUNCTION

- Light Capability Rough Terrain Forklift
- Diesel powered, air transportable used for lifting palletized loads up to 5,070 pounds.
- Equipped with a telescopic boom, 2-wheel, 4-wheel, and crab steering modes.
- Required to clear landing zones of supplies and equipment, to load and unload combat vehicles, aircraft, and ISO containers.
- Manufactured by Terex

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ENGINEER EQUIPMENT

**SKYTRACK
EBFL MMV**



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ENGINEER EQUIPMENT

SKYTRACK EBFL MMV

DESCRIPTION AND FUNCTIONS

- Extendable Boom Fork Lift
- Military Millennium Vehicle (MMV)
- Diesel powered, for lifting loads up to 11,000 pounds
- Air transportable, rough-terrain, self-deployable material handler.
- Primary function is to provide operating forces the capability to move/load/unload supplies, equipment, vehicles, containers, and palletized cargo from amphibious/merchant ships, aircraft, and vehicles over beaches as well as inland via unimproved/hard surfaces.

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ENGINEER EQUIPMENT

**CASE
1150
DOZER**



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ENGINEER EQUIPMENT

1150 DOZER

DESCRIPTION AND FUNCTION

- Full-tracked, diesel engine driven tractor
- Hydraulically operated angle blade and winch
- Air transportable
- Used for earthmoving and general construction work.
- Manufactured by Case
- Travels up to 6.3 mph (10 km/h).

ENGINEER EQUIPMENT

ENGINEER EQUIPMENT REVIEW

- TRAM
- MCT
- Backhoe loader
- Grader
- Terex
- MMV
- 1150

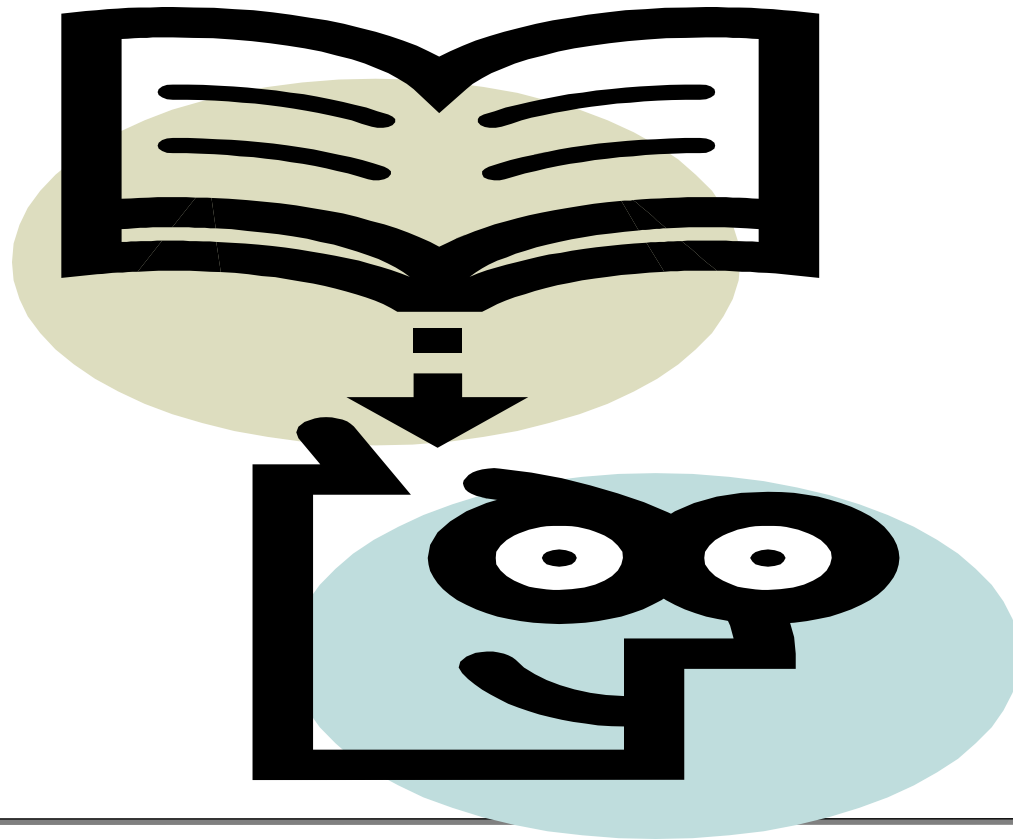
ENGINEER EQUIPMENT

QUESTIONS

- Q: What is the maximum lifting capacity of the Terex 5K LCRTF?
- A: 5070 lbs.
- Q: What company manufactures the TRAM?
- A: John Deer

ENGINEER EQUIPMENT

Break



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TECHNICAL MANUAL



5/25/17

TECHNICAL MANUAL

INTRODUCTION

- Every piece of equipment in the Marine Corps utilizes Technical Manuals (TM) and repair parts lists (SL-4, PC, etc.)
 - These manuals are necessary for performing maintenance and ordering parts
 - TMs provide step by step maintenance procedures in order to perform the maintenance accurately and efficiently.
 - Parts lists provide requisitioning data for every component or item on their associated piece of gear

TECHNICAL MANUAL

TECHNICAL MANUAL (TM)

- Ensures the correct action is taken to solve or prevent problems in a timely manner
- TMs provide the mechanic and operator with PMCS, troubleshooting, and CM procedures to include:
 - Inspections
 - Adjustments
 - Preventive maintenance intervals
 - Troubleshooting and testing
 - Removal/installation of parts
 - Disassembly/reassembly of components
 - Special tools and TMDE

TECHNICAL MANUAL

TECHNICAL MANUAL

- With new pieces of gear come new technical manuals (TM)
 - Some may be constructed differently than others but they all cover the same basic concept as previously explained
- New TMs are generally designed by the Manufacturer of the piece of equipment
 - The Marine Corps adds a “Short Title” and information applicable to our supply system and maintenance procedures.

TECHNICAL MANUAL

TECHNICAL MANUAL

Identifying Front Cover Information

- **Short Title** = TM 11503A-OI/4
- **TM** = indicates this is a Technical Manual
- **11503** = Item Designator number (MCT)
- **A=** indicates this TM covers a particular model. Lack of this indicates that more than one model is covered.
- **OI=** This manual covers Organizational(Operator/Crew) and Intermediate(Field) maintenance.

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TECHNICAL MANUAL

TECHNICAL MANUAL

TM 11503A-OI/4

850JR Crawler Dozer Repair

TECHNICAL MANUAL
850JR MCT Repair Manual

TM10780 15JAN09 (ENGLISH)

For complete service information also see:

850JR Crawler Dozer Operation and Test . . .	TM10779
850JR Crawler Dozer Operator's Manual . . .	OMT242091
9.0L OEM Diesel Engines—Base Engine Repair	CTM400
9.0L Diesel Engines—Level 14 Electronic Fuel System with Denso HPCR	CTM385
Undercarriage Appraisal Manual	TM10989

Worldwide Construction
And Forestry Division
LITHO IN U.S.A.

PCN 500 115039 00

TM 10794B-OI/A

U.S. MARINE CORPS TECHNICAL MANUAL

ORGANIZATIONAL AND INTERMEDIATE MAINTENANCE MANUAL
WITH REPAIR PARTS LIST

FOR

FORKLIFT, EXTENDABLE BOOM (EBFL)

MODEL: MMV (TIER 2)

NSN: 3930-01-508-0886



MARINE CORPS SYSTEMS COMMAND
QUANTICO, VA 22134-6050

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TECHNICAL MANUAL

TECHNICAL MANUAL

- The Medium Crawler Tractor utilizes multiple technical manuals to cover various maintenance aspects
 - Operation and test (TM 11503A-OI/3)
 - Theories of operation
 - Identifying problems using common sense and diagnostic trouble codes
 - Repair (TM 11503A-OI/4)
 - Repair of components
 - CTM (Component Technical Manual)
 - Repair of major assemblies
 - Engine, in-depth fuel system, winch

TECHNICAL MANUAL

TECHNICAL MANUAL

How to Read

- The manufacturer TMs seem less inclusive than older Marine Corps TMs but goes farther into detail and are seemingly simpler to read and comprehend. (e.g. Separate manuals for winch, ripper, etc.)
- Introductions, safety information, and a table of contents are presented within the first section/s of the TM

SECTION 04—Engine

MCT TECHNICAL MANUAL

Contents

SECTION 00—General Information
Group 0001—Safety
Group 0003—Torque Values

SECTION 01—Tracks
Group 0130—Track System

SECTION 02—Axles and Suspension Systems
Group 0201—Drive Axle Housing and Support
Group 0250—Axle Shaft, Bearings and Reduction Gears

SECTION 03—Transmission
Group 0315—Control Linkage
Group 0360—Hydrostatic System

SECTION 04—Engine
Group 0400—Removal and Installation

SECTION 05—Engine Auxiliary Systems
Group 0505—Cold Weather Starting Aid
Group 0510—Cooling System
Group 0515—Engine Speed Control
Group 0530—External Exhaust Systems
Group 0560—External Fuel Supply Systems

SECTION 07—Dampener Drive
Group 0752—Elements

SECTION 11—Park Brake
Group 1100—Park Brake
Group 1115—Control Linkage
Group 1160—Hydraulic System

SECTION 15—Equipment Attaching
Group 1511—Drawbar

SECTION 17—Frames, Chassis, or Supporting Structure
Group 1740—Frame Installation
Group 1746—Frame Bottom Guards

SECTION 18—Operator's Station
Group 1800—Removal and Installation

All information, illustrations and specifications in this manual are based on the latest information available at the time of publication. The right is reserved to make changes at any time without notice.

Group 1810—Operator Enclosure
Group 1821—Seat and Seat Belt
Group 1830—Heating and Air Conditioning

SECTION 19—Sheet Metal
Group 1910—Hood and Engine Enclosures

SECTION 20—Safety, Convenience and Miscellaneous
Group 2004—Horn and Warning Devices

SECTION 30—Winch
Group 3060—Winch Hydraulic System

SECTION 32—Bulldozer
Group 3201—Blade
Group 3240—Frames
Group 3260—Hydraulic System

SECTION 42—Ground Conditioning Tool
Group 4243—Ripper

SECTION 98—Reference Information
Group 9800—Reference Information—Operator's Manual

SECTION 99—Dealer Fabricated Tools
Group 9900—Dealer Fabricated Tools

04

04

0400

4

Removal and Installation

21. Disconnect positive battery cable (9) and ground strap (10) from starter.

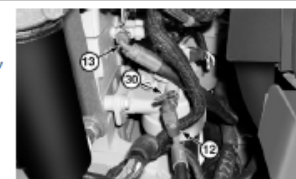


Starter

Photo: 10000001-10-000000-000

22. Close fuel shutoff valve (30). See Fuel Drain and Shutoff Valve. (Operator's Manual.)

NOTE: There is an alternate fuel shutoff valve (11) below fuel tank at rear of machine, accessible by removing rear access cover.



Fuel Shutoff Valve (engine)

11—Alternate Fuel Shutoff Valve
12—Fuel Supply Line
13—Fuel Return Line
30—Fuel Shutoff Valve



Alternate Fuel Shutoff Valve (below fuel tank)

Continued on next page

Photo: 10000001-10-000000-000

TECHNICAL MANUAL

TM 10794B-OM/A

M

Table of Contents - Continued

Table of Contents

- located in the front of the manual in the publication
- Chapters divide information
- Each Chapter is identified by a number located on the left
- If you cannot find the *Table of Contents*, refer to the alphabetical *Index* at the back of the manual.

	Page Number
CHAPTER 3 PREVENTIVE MAINTENANCE	
WP 0011 00 Service Upon Receipt	0011 00-1
WP 0012 00 Preventive Maintenance Checks and Services (PMCS) Introduction, Including Lubrication Instructions	0012 00-1
WP 0013 00 Preventive Maintenance Checks and Services (PMCS)	0013 00-1
CHAPTER 4 ORGANIZATIONAL MAINTENANCE	
WP 0014 00 General Maintenance Instructions	0014 00-1
WP 0015 00 Fuel Lift Pump Replacement	0015 00-1
WP 0016 00 Fuel Injector Replacement	0016 00-1
WP 0017 00 Cooling System Maintenance	0017 00-1
WP 0018 00 Cooling Thermostat Replacement	0018 00-1
WP 0019 00 Radiator/Cooler Replacement	0019 00-1
WP 0020 00 Alternator Replacement	0020 00-1
WP 0021 00 Starter Replacement	0021 00-1
WP 0022 00 Accessory Drive Belt Replacement	0022 00-1
WP 0023 00 Air Conditioning System Maintenance	0023 00-1
WP 0024 00 Air Conditioning Compressor Replacement	0024 00-1
WP 0025 00 Tire and Wheel Replacement	0025 00-1
WP 0026 00 Driveshaft Replacement	0026 00-1
WP 0027 00 Hydraulic Hoses, Tubes, and Fittings Maintenance	0027 00-1
WP 0028 00 Joystick Control Valve Replacement	0028 00-1
WP 0029 00 Service Brake Control Valve Replacement	0029 00-1

TECHNICAL MANUAL

- Every piece of equipment in the Marine Corps utilizes Technical Manuals (TM) and repair parts lists (SL-4, PC, etc.)
 - These manuals are necessary for performing maintenance and ordering parts
 - TMs provide step by step maintenance procedures in order to perform the maintenance accurately and efficiently.
 - Parts lists provide requisitioning data for every component or item on their associated piece of gear

TECHNICAL MANUAL

TECHNICAL MANUAL REVIEW

- What a TM covers.
- Short titles.
- How to read TM's.

TECHNICAL MANUAL

QUESTIONS

- **Q:** What does 11503 mean in a short title?
- **A:** This is the ID number.
- **Q:** What does a parts list provide the mechanic?
- **A:** Provides the requisitioning data for every component or item on that associated piece of gear.

SHOP
OPERATIO
NS

TECHNICAL MANUAL



5/25/17

RECORDS AND FORMS



RECORDS AND FORMS

RESPONSIBILITIES

- It is your responsibility to ensure you are using the proper record or form and that you are using it correctly.
- TM 4700-15/1 and UM 4790-2C are the references that provide guidance in regards to the use of maintenance records and forms.
 - TM 4700-15/1 provides instructions for the preparation, use, and disposition of required records and forms.
 - UM 4790-2C provides functional procedures of the maintenance Process.

RECORDS AND FORMS

NAVMC 10560

PURPOSE

- Provides a checklist for performing and recording preventive maintenance checks and services (PMCS) and Limited Technical Inspections (LTI).
- The equipment owner, user or custodian is responsible for initial preparation to include the heading

RECORDS AND FORMS

NAVMC 10560

TYPES

- Acceptance LTI's - Performed by maintenance personnel upon receipt of equipment and prior to placing the equipment in service.
- LTI's prior to Repair - The equipment chief will ensure that any equipment requiring repairs is inspected and results recorded on the NAVMC 10560 before the equipment is repaired.
- Preventive Maintenance - The maintenance unit, with the assistance of the operator performs required services, records them on the NAVMC 10560, and signs the worksheet indicating that the services have been performed.

PM

CM

A

SERVICING SYMBOLS (SS)

A - ADJUST
C - CLEAN
I - INSPECT
S - SERVICE
T - TIGHTEN

WORKSHEET FOR PREVENTIVE MAINTENANCE AND TECHNICAL INSPECTION FOR ENGINEER EQUIPMENT

APPLICABLE REFERENCES (SEE INSTRUCTIONS ON PAGE 6)
TM 4700 - 15/1_ (TACTICAL EQUIPMENT RECORD PROCEDURES)

LEGEND FOR MARKING (SS)

N/A - NOT APPLICABLE
M - MISSING
✓ - SATISFACTORY
X - ADJUSTMENT REQUIRED
XX - REPAIR REQUIRED
XXX - REPLACEMENT REQUIRED
D - IMMEDIATE D/L
U - UNSATISFACTORY
MR - MODIFICATIONS REQUIRED

NOMENCLATURE Medium Crawler Tractor		MAKE John Deere		MODEL 850 JR	
ORGANIZATION 2D Maintenance BN		DATE 9249	HOURS 832	MILES N/A	REGISTRATION NO. 640616
ENGINE MAKE / MODEL (IF APPLICABLE, LIST BOTH ENGINES)		ENGINE SERIAL NO. (IF APPLICABLE, LIST BOTH ENGINES)		ATTACHMENTS N/A	
1. John Deere / 6090		1. 08Z40429		MAKE AND MODEL N/A	
2. (USE ADDITIONAL FORM)		2. (USE ADDITIONAL FORM)		SERIAL NO. N/A	

<input type="checkbox"/> EQUIPMENT RECORD FOLDER	<input type="checkbox"/> PUBLICATIONS AVAILABLE	<input type="checkbox"/> APPEARANCE	<input type="checkbox"/> OPERATOR'S DAILY PM	<input type="checkbox"/> N/A FIRE EXTINGUISHER	<input type="checkbox"/> N/A TOOLS AND EQUIPMENT
--	---	-------------------------------------	--	--	--

B

REMARKS AND RECOMMENDATIONS / DISPOSITION INSTRUCTIONS

C

ITEM COST (CURRENT) \$	EQUIPMENT AGE YEARS ____ MONTHS ____	REPAIR LIMIT		EST. COST THIS REPAIR \$	CONDITION CODE
		% ONE TIME	COST LIMIT		

D	S	ENGINE AND POWER UNIT	D	S	ENGINE AND POWER UNIT (ELECTRICAL SYSTEM)																
1	XXX	CYLINDER HEAD (GASKET, LEAKS, CRACKS)	26	Ü	EMERGENCY SHUTDOWN DEVICES (CONNECTIONS, LINKAGE)																
2	Ü	EXHAUST SYS. (MANIFOLD, MUFFL., CONNECTIONS, PIPE) EXHAUST BACK PRESSURE, PSI (Hg) SMOKE ANALYSIS, (BLACK, BLUE, WHITE)	27	N/A	SPARK PLUGS (CRACKS, DISCOLORATION, FOULING)																
3	Ü	VALVE MECHANISM (COVERS, SPRINGS, ROCKER ARMS, PUSH RODS, CLEARANCE)	28	Ü	BATTERY (CASE, TERMINALS) SPECIFIC GRAVITY																
4	N/A	COMPRESSION TEST (TI OR MALFUNCTION ONLY) <table><tr><td>N</td><td>O</td><td>T</td><td></td><td></td><td></td><td></td><td></td></tr><tr><td></td><td></td><td></td><td>T</td><td>A</td><td>K</td><td>E</td><td>N</td></tr></table>	N	O	T									T	A	K	E	N	29	Ü	BATTERY (BOX, HOLD DOWNS, CABLES, CONNECTIONS)
			N	O	T																
			T	A	K	E	N														
30	XXX	BATTERY SLAVE RECEPTACLE	Cap missing																		
5	Ü	CRANKCASE (LEAKS, OIL LEVEL) BREATHER (CLEAN)	31	Ü	BATTERY CHARGING GENERATOR / ALTERNATOR (MOUNTING, CONNECTION, BRUSHES COMMUTATOR) OUTPUT 26V AMP @ 1000 RPM																
6	Ü	OIL FILTER / COOLERS (LEAKS, CLEAN)	32	Ü	VOLTAGE REGULATOR (SEAL, CONNECTIONS, GROUND)																
7	Ü	OIL PUMP PRESSURE/TEMPERATURE 28 PSI 210 F	33	N/A	DISTRIBUTOR / MAGNETO (CAP, ROTOR, POINTS, MOUNTING, CONNECTIONS)																
8	Ü	ANTI FREEZE (SPECIFIC GRAVITY) PROTECTED TO 40 F	34	N/A	IGNITION COIL (MOUNTING, CABLE)																
9	Ü	WATER PUMP, FAN, SHROUD, (LEAKS, ALIGNMENT, MOUNTING)	35	Ü	STARTER (MOUNTING, CONNECTIONS, BRUSHES, COMMUTATOR)																
10	Ü	RADIATOR (CORE, SHUTTERS, HOSES, CAP) (LEAK, RESTRICTION, DAMAGE)	36	XX	LIGHTS (CONNECTIONS, MOUNTING) DASH (BLACKOUT) HEAD, TAIL, CLEARANCE, WORKING																
11	X	ACCESSORY DRIVE BELTS AND PULLEYS (CRACKS, ROT, ALIGNMENT)	loose	37	Ü	WIRING HARNESS (CONNECTION, INSULATION)															
12	Ü	GOVERNOR AND LINKAGE (LINKS, ALIGNMENT, OPERATION)	38	Ü	SWITCHES (MOUNTING, CONNECTIONS)																
13	N/A	OVERSPEED GOVERNOR (CONNECTIONS, OPERATION)	39	Ü	METERS (VOLT, AMP, HOUR, ODOMETER, TACHOMETER, SPEEDOMETER) (MOUNTING, CONNECTIONS)																
14	Ü	AIR BOX (DRAINS, RESTRICTIONS, GASKETS) AIR BOX PRESSURE _____ PSI (Hg)	40																		
15	XXX	AIRCLEANER / PRECLEANERS (LEAKS, CONNECTIONS, MOUNTING, RESTRICTIONS)	41																		
16	N/A	CARBURETOR / LINKAGE (LEAKS, ALIGNMENT)	42																		
17	Ü	BLOWER TURBOCHARGER (LEAKS, SEALS, MOUNTING, SCREEN)	43																		
18	Ü	INJECTORS, INJECTOR PUMPS (LEAKS, FILTERS, RESTRICTIONS)	E	S	POWER TRAINS																
19	Ü	FUEL TANK, CAP, MOUNTING (VALVES, LINES, TRAPS, SCREEN)																			
20	Ü	FUEL FILTER (LEAKS, RESTRICTION, DRAIN)																			
21	Ü	FUEL PUMPS (HOUSING, LINES, CONNECTIONS, SEDIMENT BOWL)																			
22	Ü	FUELS LINES / CONNECTIONS (CRACKS, LEAKS)																			
23	Ü	GAUGES (FUEL, OIL TEMP, PRESSURE) OPERATION																			
24	Ü	STARTING AID (CONNECTIONS, LINES)																			
25	N/A	ENGINE AIR COMPRESSOR (GASKETS, SEALS, BREATHERS)																			
1		UNIVERSAL JOINTS, DRIVE SHAFTS																			
2		GEAR HOUSINGS (CASES, GASKETS, SEALS, LEAKS, OIL LEVEL)																			
3		GEARS AND PINIONS																			
4		BEARINGS, SHAFTS AND DRUMS																			
5		TRANSMISSION, TRANSFER CASES (GASKETS, SEALS, LEAKS, OIL LEVEL) HARD TO SHIFT, NOISE																			
6		DRIVE SPROCKETS (CHAINS, BELTS, PULLES)																			

PAGE 2

E	S	POWER TRAINS (CONTINUED)	F	S	FRAME AND SUSPENSION (CONTINUED)
	S			S	
7		STEERING AND TRAVEL CLUTCHES	8		BUCKET / BLADE LIFT ARMS
8		FINAL DRIVE DIFFERENTIAL (HOUSING, GASKETS, SEALS, OIL LEVEL)	9		BUCKET / BLADE SIDE ARMS
9		POWER TAKE OFF UNIT	10		TIE RODS, LINKAGE, BOOTS AND SEALS
10		JAW OR PIN CLUTCH	11		FULCRUM ARMS, REACH ARMS, LINKAGE
11		OPERATING CLUTCHES AND BRAKES	12		CAB HOUSING (PANELS, DOORS, BRACKET, HINGES, FASTENERS)
12		TRAVEL AND SWING LOCK	13		BASE SKIDS (BENTMEMBERS, WELDS, LIFTING DEVICES)
13		SERVICE BRAKES	14		LEVELS, PEDALS, LINKAGE, CABLES, CONTROLS
14		PARKING / EMERGENCY BRAKES	15		STEERING OR LEANING WHEEL
15		SHOES, PISTONS, BANDS	16		STEERING GEAR ASSEMBLY
16		DRUMS, DISCS	17		BOOSTER STEERING ASSEMBLY
17		PEDALS, LINKAGE, CABLE, LINES AND FITTINGS	18		SWING LOCK
18		MASTER CYLINDER (POWER PACK) (SLAVE CYLINDER)	19		HYDRAULIC CYLINDERS (LEAKS, SEALS, DAMAGED)
19		AIR TANK	20		HYDRAULIC LINES AND CONNECTIONS (LEAKS, DAMAGE)
20		AIR VALVES, LINES, FITTINGS	21		MAST ASSEMBLY, BOOM
21			22		GANTRY SHEAVES, CABLES, PINS, LOCKS
22			23		SAFETY CHAINS
23			24		TRACK ASSEMBLY (PLATES, LINKS, BUSHINGS, PINS, IDLER, ROLLERS, SPRINGS, BUSHINGS)
F	S	SKIDS / FRAME AND SUSPENSION	25		TRACK TENSION
			26		FIFTH WHEEL, TOW, HITCH, PINTLE, HOOK
			27		YOKE ASSEMBLY
1		FRAME (CRACKS, WELDS, ALIGNMENT)	28		TAILGATE, BOWL, HINGE PINS, EJECTOR, APRON
2		GUARDS AND OUTRIGGERS (CYLINDERS, HOSES)	29		STOPLOCK SPRINGS
3		SPRINGS, EQUALIZERS, STABILIZERS	30		CENTER PIN OR GUDGEON
4		TIRES (PRESSURE, CONDITION)	31		AIR LINES AND CONNECTIONS
5		FRONT AXLE ASSEMBLY, WHEELS (BEARINGS, MOUNTS, BALL JOINTS)	32		DUCT, DUCT HOUSING, CABLE ASSEMBLY
6		REAR AXLE ASSEMBLY, WHEELS (BEARINGS, MOUNTS, BALL JOINTS)	33		PLENUMS
7		"A" FRAME OR YOKE, PUSH BEAMS			
PAGE 3					

G	S S	ATTACHMENTS / BLADES / CUTTING EDGES (Check applicable block in lines 1 through 5)	H	S S	PUMPS AND COMPRESSORS (CONTINUED)
1	ü	<input type="checkbox"/> AUGER <input type="checkbox"/> BACKHOE <input checked="" type="checkbox"/> BLADES	12		CYLINDER HEADS (GASKETS, CRACKS, LEAKS)
2	N/A	<input type="checkbox"/> BUCKET <input type="checkbox"/> BUCKET MULTIPURPOSE <input type="checkbox"/> CLAMSHELL	13		CRANKCASE (LEAKS, OIL LEVEL)
3	N/A	<input type="checkbox"/> COMPACTOR VIBRATOR <input type="checkbox"/> DRAGLINE <input type="checkbox"/> FORKS	14		GAUGES (OIL, AIR)
4	N/A	<input type="checkbox"/> HAMMER IMPACT <input type="checkbox"/> WINCH <input type="checkbox"/> PILE DRIVER	15		UNLOADERS
5	N/A	<input type="checkbox"/> RIPPER <input type="checkbox"/> SCRAPERS <input type="checkbox"/>	16		LINE OILERS (CONNECTIONS, STRAINERS)
6	ü	DRUMS, SHEAVES, CABLES, LEADS AND GUIDES	17		SPRINKLING SYSTEM (TANKS, LINES, MOUNTING)
7	ü	CUTTING EDGES, CORNER SHOES, BOOTS, END BITS, TEETH	18		CONTROLS
8	N/A	SKIPPER SHAFT AND SADDLE BLOCK ASSEMBLY	19		TOOLS / ACCESSORIES (PNEUMATIC TOOL OUTFIT)
9	N/A	TAGLINE, GANTRY, HAMMER LEADS, BLOCKS	20		
10	ü	DRAWBAR, SCARIFIER, CIRCLE	21		
11	ü	HYDRAULIC LINES / CYLINDERS	22		
12					
13					
			I	S S	MOBILE ELECTRIC POWER GENERATING SOURCE (Complete engine and power unit section before proceeding)
H	S S	PUMPS AND COMPRESSORS WATER / HYDRAULIC / PNEUMATIC	1		GOVERNOR ASSEMBLY (MODULES, TERMINALS, ADJUSTMENTS, CONNECTORS)
			2		ALTERNATOR ASSEMBLY (BEARINGS, STARTER, ROTOR, DIODES, COOLING FAN, INTAKES, FLEXIBLE COUPLING)
1		RESERVOIR, TANK (LEAKS, CRACKS, WELDS, BREATHERS, FILTERS, STRAINERS)	3		ELECTRIC / ELECTRONIC WIRING HARNESSES, CONNECTORS
2		PUMP (MOUNTING, HOUSING) OUTPUT ____ PSI ____ GPM	4		PLUG-IN MODULES, LOAD CONTACTORS
3		RELIEF VALVES ____ PSI	5		PRINTED CIRCUIT BOARDS (CRACKS, DIRT, CONFORMAL COATING, COMPONENT MOUNTING)
4		CONTROL VALVES (LINKAGE, LEVERS) CUT IN PRESSURE ____ PSI CUT OUT PRESSURE ____ PSI	6		CONTROL CABINET (MOUNTS, CONNECTORS, COMPONENT MOUNTING)
5		VALVES (FLOW, CHECK)	7		PROTECTIVE CIRCUIT (OPERATION, TRIP POINT RANGES)
6		CYLINDERS (LEAKS, MOUNTING)	8		CABLES (REMOTE OPERATION, PARALLELING, CONNECTIONS)
7		HOSES AND CONNECTIONS (LEAKS, CRACKS)	9		HOUSING (SEALS, COMPARTMENTS, FASTENERS, MARKINGS)
8		FILTERS / STRAINERS	10		AUXILIARY WINTERIZATION KIT (COMPLETENESS, OPERATION)
9		SHAFT, COUPLING, BEARINGS	11		TERMINAL BOARD
10		IMPELLER, DIAPHRAGM	12		VOLTAGE REGULATOR
11		INTER COOLER, RELIEF VALVE ASSEMBLY, LINES	13		RELAYS

J	S S	REFRIGERATION / AIR CONDITIONING	L	S S	CHAIN AND POWER SAW (Complete engine and power unit section before proceeding)
1		COMPRESSOR	1		TABLE TILTING SCREW
2		BELTS, PULLEYS, SHEAVES	2		COLUMN BASE AND FRAME
3		METERING DEVICE	3		SPROCKET AND CHAIN (OILER)
4		EVAPORATOR COIL	4		SAW GUARDS
5		CONDENSER COIL	5	*	MITRE GAUGE
6		TEMPERATURE CONTROLS	6		BLADES (CONDITION)
7		SIGHT GLASS	7		STARTER RECOIL SYSTEMS
8		GASKET, DOOR	M	S S	MARINE EQUIPMENT (Complete engine and power unit section before proceeding)
9		REFRIGERANT (SHORT, HIGH)			
10		LEAKS (OIL, REFRIGERANT)	1		HULL (LEAKS, CRACKS, BROKEN, MISSING)
11		TIMER DEFROST	2		ELECTRICAL (RADAR, RADIO, LIGHTS)
12		VALVES (SERVICE, PRESSURE, REGULATING, SOLENOID, CHECK)	3		CREW SERVED ARMAMENT
13		RELAYS / CONTACTORS	4		PROPULSION EQUIPMENT
14		CONTROL BOX	5		TRAILER (TIRES, FRAME, LIGHTS)
15		HOUSINGS	6		
16		STATOR / ROTOR / END BELLS / BEARINGS	7		
17		MOUNTINGS	8		
18		CAPACITORS	9		
19		ELECTRICAL SWITCHES AND CONNECTORS AND WIRING	10		
K	S S	WATER SUPPLY EQUIPMENT (Check Power Supply, Pumps first)	11		
			12		
1		CHLORINE, CYLINDER OR BAG CHLORINE (TEST FEED)	13		
2		PRESSURE REGULATOR (CHLORINE)	14		
3		VALVES AND STRAINERS	15		
4		FILTER SECTION	16		
5		TANKS	17		

PM

CM

A

SERVICING SYMBOLS (SS)

A - ADJUST
C - CLEAN
I - INSPECT
S - SERVICE
T - TIGHTEN

WORKSHEET FOR PREVENTIVE MAINTENANCE AND TECHNICAL INSPECTION FOR ENGINEER EQUIPMENT

APPLICABLE REFERENCES (SEE INSTRUCTIONS ON PAGE 6)
TM 4700 - 15/1_ (TACTICAL EQUIPMENT RECORD PROCEDURES)

LEGEND FOR MARKING (SS)

N/A - NOT APPLICABLE
M - MISSING
✓ - SATISFACTORY
X - ADJUSTMENT REQUIRED
XX - REPAIR REQUIRED
XXX - REPLACEMENT REQUIRED
D - IMMEDIATE D/L
U - UNSATISFACTORY
MR - MODIFICATIONS REQUIRED

NOMENCLATURE

Medium Crawler Tractor

MAKE

John Deere

MODEL

850 JR

ORGANIZATION

2D Maintenance BN

DATE

9249

HOURS

832

MILES

N/A

REGISTRATION NO.

640616

ENGINE MAKE / MODEL

(IF APPLICABLE, LIST BOTH ENGINES)

ENGINE SERIAL NO.

(IF APPLICABLE, LIST BOTH ENGINES)

ATTACHMENTS

Winch

1.

John Deere / 6090

1.

08Z40429

MAKE AND MODEL

John Deere / 850 JR

2.

(USE ADDITIONAL FORM)

2.

(USE ADDITIONAL FORM)

SERIAL NO.

T0850JR 175862

INDICATE PURPOSE

TECHNICAL INSPECTION (TI)

LIMITED TECH. INSPECTION (LTI)

HOURLY PM HRS.

OTHER (STATE)

EQUIPMENT RECORD
FOLDERPUBLICATIONS
AVAILABLE

APPEARANCE

OPERATOR'S
DAILY PM

N/A FIRE EXTINGUISHER



N/A TOOLS AND EQUIPMENT

B

REMARKS AND RECOMMENDATIONS / DISPOSITION INSTRUCTIONS

D-1 Cylinder head gasket leaks

D-11 Fan belts loose

D-15 Air-cleaner Dirty

D-30 Slave receptacle cap missing

D-36 Broken wire to R/S blackout light

C

ITEM COST (CURRENT)

\$

EQUIPMENT AGE

YEARS _____ MONTHS _____

REPAIR LIMIT

% ONE TIME

COST LIMIT

EST. COST THIS REPAIR

\$

CONDITION CODE

RECORDS AND FORMS

RECORDS AND FORMS REVIEW

- References for records and forms
- Purpose of the NAVMAC 10560
- How to fill out a NAVMAC 10560 (LTI Sheet)

RECORDS AND FORMS

QUESTIONS

- **Q:** What are the two references used for records and forms?
- **A:** UM 4790.5c and TM 4700-15/1H
- **Q:** What form provides a checklist for performing and recording preventative maintenance checks and services (PMCS) and Limited technical inspections (LTI)?
- **A:** NAVMC10560 (LTI sheet)

RECORDS AND FORMS



SHOP
OPERATIONS

PUBLICATIONS



5/25/17

PUBLICATIONS

PARTS MANUALS

- John Deere (MCT 850JR)
 - PC10086 (Parts Catalog)
 - Lists all repair parts and components applicable to the MCT
- JLG (MMV EBFL)
 - TM 10794B-OI/A (repair AND parts manual combined)
 - Lists all repair parts and components applicable to the MMV
- SL-3-11668A (GMTK Stock List)
 - In general, an SL-3 provides a listing of parts and/or components that make an item complete

PUBLICATIONS

MCT PARTS MANUAL

- PC10086 (MCT Parts Catalog)
 - Cover page is read in the same manner as the TM
 - PGs 00I-2 through 00I-29 (general information and contents)
 - Provide information regarding the equipment's serial numbers, remarks and abbreviations, and contains the alphabetical index with page numbers referencing where parts and components are located throughout the manual
 - PGs 0131-2 through 4201-10 (parts/components listing)
 - Provides a listing of parts, components, and requisition data
 - PGs 00II-1 through 00II-21 (Numerical Index)
 - Used to look up part numbers in an alpha-numeric format

MCT PARTS MANUAL

Alphabetical Index

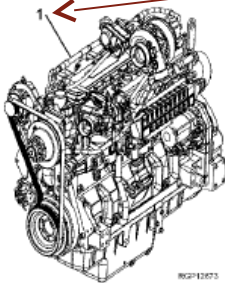
AIR CLEANER FILTER (ELEMENT PRIMARY AND SECONDARY, SENSOR AND HOSE)0521-8

PART NAME

PAGE NUMBER

0001-8		850J CRAWLER DOZER	
ALPHABETICAL INDEX		PAGE	
A		PAGE	
A/C COMPRESSOR CLUTCH DIODE	1674-54	AIR TEMPERATURE KNOB (SPLIT CAB)	1802-2
A/C COMPRESSOR COMPONENTS (CONNECTOR)	1832-14	AIR TEMPERATURE SENSOR	0521-8
A/C COMPRESSOR HARDWARE KIT	1832-15	AIR, RECIRCULATION FILTER (ARMORED CAB)	1832-4
A/C COMPRESSOR SHAFT SEAL KIT	1832-12	AIR, RECIRCULATION FILTER (SPLIT CAB)	1832-2
A/C COMPRESSOR SOLENOID CONNECTOR	1674-52	ALARM, BACKUP	2004-4
A/C CONNECTOR (ARMORED CAB)	1674-14	ALARM, 12 VOLT WITH SHUTTER	1670-4
A/C CONNECTOR (STANDARD CAB)	1674-4	ALARM, 12 VOLT WITH SHUTTER (STANDARD CAB)	1670-2
A/C COVER REAR (ARMORED CAB)	1811-14	ALIGNMENT PINS (ARMORED CAB)	1811-10
A/C COVER REAR (SPLIT CAB)	1810-8	ALTERNATOR (GROUND CONNECTOR AND POWER CONNECTOR)	1674-52
A/C FAN RELAY CONNECTOR (ARMORED CAB)	1674-14	ALTERNATOR (80 AMP) AND COMPONENTS (BELT AND AUTOMATIC TENSIONER)	1672-2
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A/C KIT, COMPRESSOR HARDWARE	1832-15	ANGLE SECTION SPOOL VALVE PRESSURE RELIEF	3262-24
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PUBLICATIONS

MCT PARTS MANUALParts
ListingREPLACEMENT ENGINE
RG212573 UN-10MAY08

KEY	PART NO.	PART NAME	QTY.	ENGINE SERIAL NO.	REMARKS
1	RE537203	DIESEL ENGINE	1	(CA)	

KEY	PART NO.	PART NAME	QTY.	ENGINE SERIAL NO.	REMARKS
1	RE537203	DIESEL ENGINE	1	(CA)	

This line provides part information and is referenced to the illustration using a key number.

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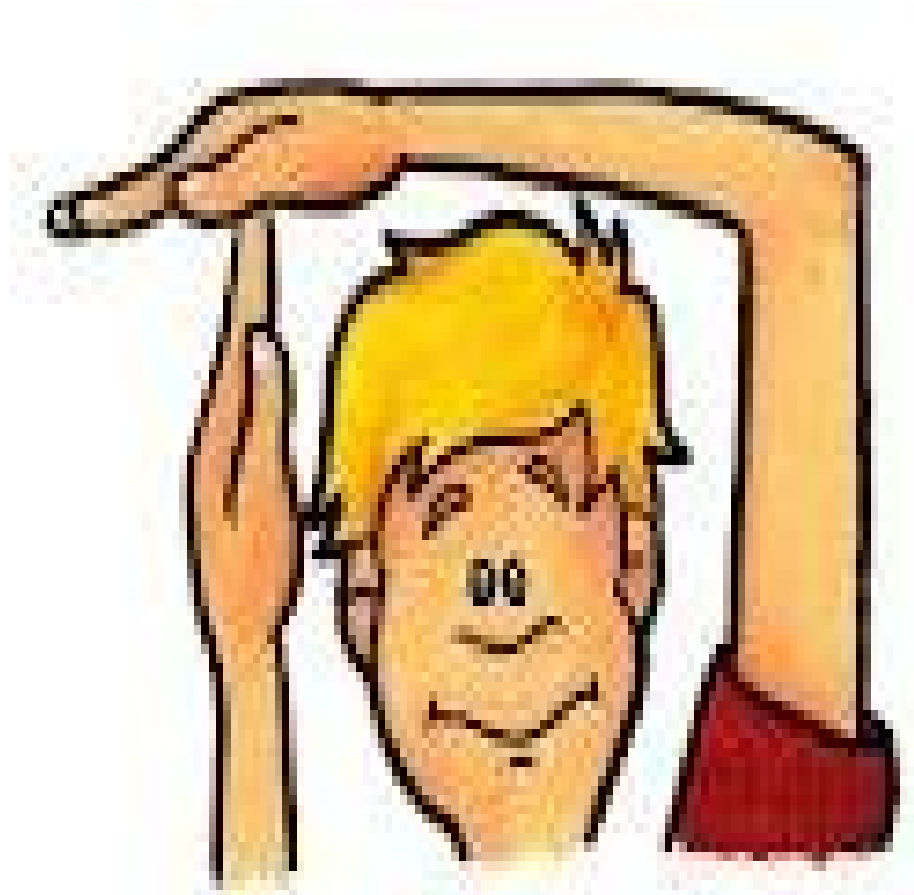
0400-61

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BSAR CHAWL ER DOZE

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RE529320	4	0400-36	R104587	2	1674-0	R213663	32	0362-3
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PUBLICATIONS



PUBLICATIONS

MMV PARTS MANUAL

TM 10794B-OI/A (MMV repair manual and parts list)

- This TM is a repair manual but it also incorporates a full repair parts list for the MMV
- The first section was covered during a previous instruction.
- Repair parts are located within Chapter 6. This chapter provides you with references, diagrams and schematics, torque limits, tool ID lists, expendable and durable items list, load rating chart, and a repair parts list (on page 0107 00-1).

PUBLICATIONS

MMV PARTS MANUAL

TM 10794B-OI/A (cont.)

- The first section of the Repair parts list provides you with general information (Scope) on how to decipher the information within.
- It authorizes the requisitioning, issue, and disposition of spares and repair parts as indicated by the Source, Maintenance and Recoverability (SMR) codes
 - These are five digit codes that provide you with the source of the particular part, levels of maintenance authorized to remove, use, and replace the part, repair of the part or component, and who is authorized to dispose of the item.

PUBLICATIONS

MMV PARTS MANUAL

SMR Codes

Pg 0107 00-2

0107 00-3

0107 00-4

SOURCE CODE	MAINTENANCE CODE		RECOVERABILITY CODE
XXxxx	xxXXx		xxxxX
1st two positions	3rd position	4th position	5th position
How you get an item.	Who can install, replace or use the item.	Who can do complete repair* on the item.	Who determines disposition action on an unserviceable item.

PUBLICATIONS

MMV PARTS MANUAL

SMR Codes

Pg 0107 00-2

=SOURCE CODE=
METHOD OF OBTAINING
THE ITEM

OBTAIN

PA

1 2
POSITIONS

0107 00-3

=MAINTENANCE CODES=

USE, REMOVE
REPLACE

USE

0

3
POSITION

REPAIR

REPAIR

Z

4
POSITION

0107 00-4

RECOVERABILITY
CODE

DISPOSE

Z

5
POSITION

PUBLICATIONS

MMV PARTS MANUAL

SMR Codes

KFOZZ

XBHZZ

PAHZZ

PAFHD

PUBLICATIONS

MMV PARTS MANUAL

TM 10794B-OI/A (cont.)

- Just like the SL-3 and the MCT parts manual, this TM provides illustrations of the parts listed
- Lists are composed of functional groups in installation sequence
- Each group lists parts in ascending figure and item number sequence.
- Bulk items and repair parts kits are listed separately in their own functional group.
- Items listed are shown on the associated illustrations

MMV PARTS MANUAL

WP 0108 00				(1)	(2)	(3)	(4)	(5)	(6)	(7)
				ITEM	SMR	NSN	CAGEC	PART	DESCRIPTION AND USEABLE ON CODES	QTY
				NO	CODE	NSN	CAGEC	NUMBER	(UOC)	
FIG. 1 DRIVETRAIN ASSEMBLY										
1	PCOFF	2530015039963	1YHH8	662351						
2	PAOZZ	3930015037543	1YHH8	878001						
3	PAOZZ	2530015039967	1YHH8	662337						
4	PAOZZ	3930015037544	1YHH8	878651	1	PCOFF	2530015039963	1YHH8	6623598	4
5	PAOZZ	5310015037567	1YHH8	878651						
6	PAOZZ	5310015037570	1YHH8	878651						
7	PAFHH	3040015115609	1YHH8	662405						
8	PAFHH	2520015115608	1YHH8	662405	2	PAOZZ	3930015037543	1YHH8	8780052	1
9	PAFZZ	5310015037929	1YHH8	831041	3	PAOZZ	2530015039967	1YHH8	6623376	1
10	PAFZZ	5310015038984	1YHH8	831004	4	PAOZZ	3930015037544	1YHH8	8786514	1
11	PAFZZ	5306015037927	1YHH8	831041						
12	PAFZZ	5306015037926	1YHH8	831041	5	PAOZZ	5310015037567	1YHH8	8786570	40
13	PAFHH	2520015037573	1YHH8	84104	6	PAOZZ	5310015037570	1YHH8	8786571	40
14	PAOZZ	5306012545393	1YHH8	830371	7	PAFHH	3040015115609	1YHH8	6624053	1
15	PAOZZ	5306015041519	1YHH8	830371						
16	PAOZZ	5310014405787	1YHH8	830700						
17	PAOZZ	3040015042872	1YHH8	84104						
18	PAFZZ	5310015038756	1YHH8	830704						
19	PAFZZ	5306015037930	1YHH8	831041						
20	PAOZZ	3040015042909	1YHH8	7135760						
21	PAOZZ	5306015038991	1YHH8	831004						
22	PAOZZ	5310014410028	1YHH8	8307007						
23	PAOZZ	5310015037924	1YHH8	8310464						
24	PAOZZ	3040015042872	1YHH8	7135912						
25	PAOZZ	3040015042873	1YHH8	7135922						
26	PAOZZ	5340015037591	1YHH8	8880218						
27	PAOZZ	5340014814178	1YHH8	6603712						
28	PAOZZ	5310014410055	1YHH8	8305012						
29	PAOZZ	5310015038047	1YHH8	8310578						
30	PAOZZ	5310014387019	1YHH8	8305644						

Repair parts list provide
requisition data
The parts are listed within their
groups or major assemblies

PUBLICATIONS

MMV PARTS MANUAL

TM 10794B-OI/A (cont.)

- The next section of the parts list is an NSN cross reference
 - When a National Stock Number is given, use the NIIN (remove the first four numbers of the NSN) to identify where the part is located in the parts listing by figure and item number
 - Used to visually identify parts with a known NSN and to gather requisitioning data and identify components of the SMR code
- Following the NSN cross reference is the Parts number cross reference
 - It is read and used for the same reasons as the NSN cross reference

PUBLICATIONS

COMPONENTS LIST

SL-3-11668A (General Mechanics Tool Kit)

- Used to list and identify tools within the kit
 - Provides requisitioning data, nomenclature, and an inventory checklist
 - Illustrations are used to further identify tools within the kit



PUBLICATIONS

COMPONENTS LIST

SL-3-11668A (cont.)

- The first portion of this SL-3 provides you instruction on the following:
 - How to use the manual and what each column indicates
 - Components and publications requisitioning information
 - Special notes on the material contained

PUBLICATIONS

COMPONENTS LIST

SL-3-11668A (cont.)

- The next section makes up the majority of the manual
 - First provides you with technical data applicable to that particular components list
 - Then goes right into the listing...

PUBLICATIONS

COMPONENTS LIST



Figure 2. Top Tray and Components (Sheet 1 of 2).

Illustrations are given to visually identify each component

Each component is assigned an item number and is cross referenced to its NSN, identification, and unit of measure within the parts listing

COMPONENTS LIST

SL-3-11668A

MARINE CORPS COMPONENTS STOCKLIST

SL-3-11668A

DATE:

SERIAL NO. OF END ITEM:

TOOL BOX #

3	SAFETY GLASSES: designed for use over prescription eyewear; (See Special Note 25) (One Year Warranty); PN S2500 OTG CAGE 08292	EA	INVENTORY SHEET						
			ITEM IDENTIFICATION	QTY	UOM	PERIODIC INVENTORY (in accordance with MCO PFM-2, and MCO P 460.10, as directed by the Unit Commander)	REMARKS		
			SUPPLY SYSTEM RESPONSIBILITY						
			NOTE: The "Item Number" given in column 1 for each component shall correspond to the call-out number given the component on the facing figure page.						
			Top Tray and Components						
1	TOOL BAG: zipper opens and closes, two handles; (See Special Note 25) (One Year Warranty); PN 033071 G CAGE 08292	EA	1						
			Items 2 - 4 come shipped in Tool Bag.						
2	MULTI-TOOL: Carabiner Multi-Plan 600 (MPP600), which is a folding tool; (See Special Note 25) (One Year Warranty); PN S2500 OTG CAGE 08292	EA	1						
3	SAFETY GLASSES: designed for use over prescription eyewear; (See Special Note 25) (One Year Warranty); PN S2500 OTG CAGE 08292	EA	1						
4	FACELOCK: 40-5-40 in. by 40-5-40 in.; (See Special Note 25) (One Year Warranty); PN S14000151815 CAGE 08292	EA	1						
5	SOCKET: 1-1/8 in. x 1/2 in. x 12 in. deep length; (See Special Note 25) (One Year Warranty); PN S14000151815 CAGE 08292	EA	1						
6	SOCKET: 1-1/8 in. x 1/2 in. x 12 in. deep length; (See Special Note 25) (One Year Warranty); PN S14000151815 CAGE 08292	EA	1						
7	SOCKET: 1-1/8 in. x 1/2 in. x 12 in. deep length; (See Special Note 25) (One Year Warranty); PN S14000151815 CAGE 08292	EA	1						
8	SOCKET: 1-1/8 in. x 1/2 in. x 12 in. deep length; (See Special Note 25) (One Year Warranty); PN S14000151815 CAGE 08292	EA	1						
9	SOCKET: 1-1/8 in. x 1/2 in. x 12 in. deep length; (See Special Note 25) (One Year Warranty); PN S14000151815 CAGE 08292	EA	1						
10	SOCKET: 1-1/8 in. x 1/2 in. x 12 in. deep length; (See Special Note 25) (One Year Warranty); PN S14000151815 CAGE 08292	EA	1						
11	SOCKET: 1-1/8 in. x 1/2 in. x 12 in. deep length; (See Special Note 25) (One Year Warranty); PN S14000151815 CAGE 08292	EA	1						
12	SOCKET: 1-1/8 in. x 1/2 in. x 12 in. deep length; (See Special Note 25) (One Year Warranty); PN S14000151815 CAGE 08292	EA	1						
13	SOCKET: 1-1/8 in. x 1/2 in. x 12 in. deep length; (See Special Note 25) (One Year Warranty); PN S14000151815 CAGE 08292	EA	1						
14	SOCKET: 1-1/8 in. x 1/2 in. x 12 in. deep length; (See Special Note 25) (One Year Warranty); PN S14000151815 CAGE 08292	EA	1						
15	SOCKET: 1-1/8 in. x 1/2 in. x 12 in. deep length; (See Special Note 25) (One Year Warranty); PN S14000151815 CAGE 08292	EA	1						
16	SOCKET: 1-1/8 in. x 1/2 in. x 12 in. deep length; (See Special Note 25) (One Year Warranty); PN S14000151815 CAGE 08292	EA	1						
17	SOCKET: 1-1/8 in. x 1/2 in. x 12 in. deep length; (See Special Note 25) (One Year Warranty); PN S14000151815 CAGE 08292	EA	1						
18	SOCKET: 1-1/8 in. x 1/2 in. x 12 in. deep length; (See Special Note 25) (One Year Warranty); PN S14000151815 CAGE 08292	EA	1						
19	SOCKET: 1-1/8 in. x 1/2 in. x 12 in. deep length; (See Special Note 25) (One Year Warranty); PN S14000151815 CAGE 08292	EA	1						
20	SCREWDRIVER: flat type, 1-1/8 in. by 2 in. blade; (See Special Note 25) (One Year Warranty); PN 66-267 CAGE 08292	EA	1						
21	SCREWDRIVER: hex type, 1-1/8 in. by 2 in. blade; (See Special Note 25) (One Year Warranty); PN 66-267 CAGE 08292	EA	1						
22	SCREWDRIVER: hex type, 1-1/8 in. by 2 in. blade; (See Special Note 25) (One Year Warranty); PN 66-267 CAGE 08292	EA	1						

Remember the illustration from the previous slide? What was the number given for the safety glasses? Notice the correlation...

There is no NSN given due to the fact that this kit is new and under warranty. The components will be

Inventory Legend: C-Complete I-Incomplete M-Missing U-Unserviceable

Remember the illustration from the previous slide? What was the number given for the safety glasses? Notice the correlation...

There is no NSN given due to the fact that this kit is new and under warranty. The components will be requisitioned through normal supply channels and the manufacturer of the set.

COMPONENTS LIST

SL-3-11668A MARINE CORPS STOCKLIST SL-3-11668A

DATED: _____ SERIAL NO. OF END ITEM: _____

TOOL BOX # _____

END ITEM: GENERAL MECHANICS TOOL KIT (GMTK) INVENTORY SHEET _____

[illegible]

This page provides lines for signatures when inventories of the tool box assigned are conducted. There will be one SL-3 assigned to each tool box and it is the mechanics responsibility to ensure all tools are properly accounted for on a regular basis. This is a supervised event and therefore a line is provided for their signature as well.

PUBLICATIONS

PARTS MANUAL REVIEW

- Different manuals and how they are used.
- How to read parts manuals and SL-3's

PUBLICATIONS

QUESTIONS

- **Q:** What manual is utilized for inventory purposes of the GMTK?
- **A:** SL-3.
- **Q:** What is the NIIN?
- **A:** The NIIN is the NSN without the first four characters.

PUBLICATIONS



GCSS-MC

PUBLICATIONS

GCSS-MC

- Global
 - Combat
 - Service
 - Support
-
- Marine Corps

PUBLICATIONS

GCSS-MC

- GCSS-MC provides the capability to see what equipment needs to be repaired, order parts, identify where the parts are located and who is available to perform the work.
- The Maintainer will be able to plan for, and schedule, maintenance resources and will also have the ability to review item configuration, readiness information, and past historical and ownership in a data repository environment.

PUBLICATIONS

GCSS-MC SERVICE REQUEST_

PURPOSE

- Used to request equipment services, maintenance, record maintenance performed and report maintenance performed.
- Includes but not limited to:
 - Preventive maintenance
 - Corrective maintenance
 - Limited Technical Inspections
 - Modifications
 - Calibration

PUBLICATIONS

GCSS-MC SERVICE REQUEST_

RESPONSIBILITIES

- The equipment owner, user and or custodian is responsible for initial preparation to include the heading and description of work.

PUBLICATIONS

GCSS-MC

- Advice codes
- Locators
- Groups and Sub-groups

PUBLICATIONS

GCSS-MC

Parts Request Function

- Used in conjunction with the Service Request Tasks to requisition, receipt for, cancel and record partial issues and credits of repair parts.

PUBLICATIONS

GCSS-MC

Creating a Service Request

PUBLICATIONS

GCSS-MC

Creating a Parts Request

PUBLICATIONS

GCSS-MC

Accounting for materials and time

PUBLICATIONS

GCSS-MC REVIEW

- The definition of GCSS-MC.
- The purpose and uses of GCSS-MC.
- Advise codes.
- Groups.
- Locators and subinventory.

PUBLICATIONS

QUESTIONS

- **Q:** What does the acronym GCSS-MC mean?
- **A:** Global Combat Service Support- Marine Corps.
- **Q:** What does the advise code 2P mean?
- **A:** Item required in one continuous length.

PUBLICATIONS



TOOLS



SHOP EQUIPMENT, GENERAL PURPOSE

Common #10



Common #12



Provides storage for general purpose

Highly portable and transportable

Enhances general maintenance

support

TOOLS

SHOP EQUIPMENT CONTACT MAINTENANCE COMMON NO. 20

Self-contained tool &
equipment shelter mounted on
a HMMWVA2

Hand tools, power tools,
oxy/acetylene (gas)
cutting & welding
capability, with
compressor and
pneumatic tools

utilized on contact teams



TOOLS

SHOP EQUIPMENT, GENERAL PURPOSE COMMON NO. 22



TOOLS

SHOP EQUIPMENT, GENERAL PURPOSE COMMON NO. 24



5/25/17

SHOP
OPERATIO
NS

TOOLS

SHOP EQUIPMENT, GENERAL PURPOSE COMMON NO. 30



5/25/17

SHOP
OPERATIO
NS

TOOLS

SHOP EQUIPMENT, GENERAL PURPOSE COMMON NO. 32



5/25/17

VEHICLE AUTOMATED DIAGNOSTIC SYSTEM (VADS)

- Lightweight, portable diagnostic system
- performs diagnostics on diesel engines, transmissions, central tire inflation systems, and other mechanical, electrical and hydraulic systems
 - Utilizes an Interactive Electronic Technical Manual (IETM)
- The major component is a Test Adapter Vehicle (TAV)
 - Interfaced with a PC or laptop controller

TOOLS

VEHICLE AUTOMATED DIAGNOSTIC SYSTEM (VADS)



Laptop

Test Adapter Vehicle
(TAV)



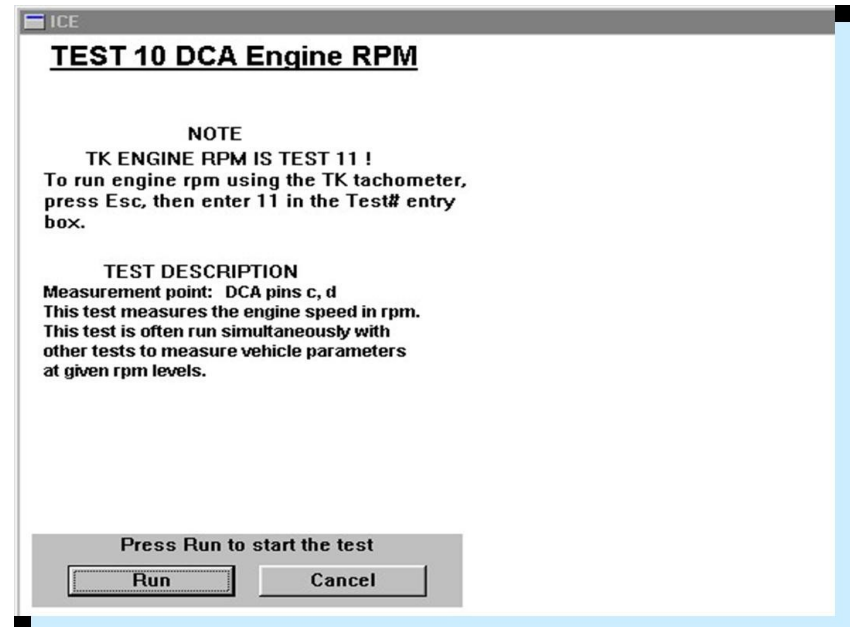
Cables

Adapter Set

VEHICLE AUTOMATED DIAGNOSTIC SYSTEM (VADS)

- It can measure voltage, resistance, and frequency on 90 different test points.

With the use of a computer, various types of tests can be run.



REQUIRED ITEMS

- Mechanics must ensure that they have the following:
 - General Mechanics Tool Kit
 - Proper Technical Manual
 - Personal Protective Equipment may vary on task to be completed

TOOLS

KEEP IN MIND

- As a mechanic, it is your responsibility to maintain the tools you are assigned and any tools that you use. (**Keep your tool set complete**)
- Keep your tools within easy reach and where they cannot fall on the deck or into equipment.
- If working outside with the elements, ensure that your tool box remains closed. This will prevent rust from forming.
- Use the right tool for the job. (**Don't use a 1/4 inch ratchet to bust rusted bolts.**)

TOOLS REVIEW

- Common tool kits.
- VADS system.
- Required items when working on gear.

TOOLS

QUESTIONS

Q: What level of maintenance utilizes the common 24?

A: Direct support field level.

Q: What are the three things needed when working on a piece of equipment?

A: General mechanic tool box, proper technical manual, and PPE.

BREAK WILL RETURN



SHOP OPERATIONS

SUMMARY

- Review Shop Operations main ideas
- Questions?
- 10 Minute break
- In-depth review of Shop Operations